## AMENDMENT TO CLAIMS

1. (Currently amended) A method of exposing a material to a neutron flux, comprising the steps of:

providing a neutron-diffusing medium around a neutron source, wherein the diffusing medium ~~is substantially transparent to neutrons and~~ includes an inner buffer region;

distributing said material in an activation region of the neutron-diffusing medium surrounding said inner buffer region, whereby neutron scattering within the diffusing medium substantially enhances the neutron flux, originating from the source, to which the material is exposed.

2. (Previously presented) A method according to Claim 1, wherein the distance, occupied by the diffusing medium, between the neutron source and the exposed material is at least one order of magnitude larger than the diffusion coefficient for elastic neutron scattering within the diffusing medium.

3. (Previously presented) A method according to Claim 1, wherein at least the activation region of the diffusing medium where the exposed material is distributed is made of heavy elements, so that multiple elastic neutron collisions result in a slowly decreasing energy of the neutrons originating from the source.

4. (Previously presented) A method according to Claim 3, wherein said diffusing medium further comprises a neutron moderator surrounding the activation region of the diffusing medium where the exposed material is distributed.

5. (Previously presented) A method according to Claim 4, wherein the diffusing medium further includes an outer buffer region, made of said heavy elements free of the exposed material, located between the moderator and the activation region of the diffusing medium where the exposed material is distributed.

6. (Previously presented) A method according to Claim 4, wherein the moderator is made of carbon or deuterated water.

7. (Previously presented) A method according to Claim 3, wherein said heavy elements are lead and/or bismuth.

8. (Original) A method according to Claim 7, wherein the neutron source consists of a central region of the lead and/or bismuth medium, which is bombarded with a high-energy charged particle beam to produce neutrons by spallation.

9. (Previously presented) A method according to Claim 8, wherein the lead and/or bismuth of said central region is in liquid phase, and is circulated by natural convection along a circuit including a heat exchanger and an auxiliary heater.

10-11. (Withdrawn)

12. (Previously presented) A method according to Claim 1, wherein the neutron source consists of a spallation target bombarded with a high-energy charged particle beam.

13-16. (Withdrawn)

17. (Currently amended) A method of producing a useful isotope, comprising the steps of:

providing a neutron-diffusing medium around a neutron source, wherein the diffusing medium ~~is substantially transparent to neutrons and~~ includes an inner buffer region;

distributing a material containing a first isotope in an activation region of the neutron-diffusing medium surrounding said inner buffer region, whereby neutron scattering within the diffusing medium enhances the neutron flux, originating from the source, to which the material is exposed; and

recovering said useful isotope from the exposed materia l.

18. (Previously presented) A method according to Claim 17, wherein at least the activation region of the diffusing medium where the exposed material is distributed is made of heavy elements, so that multiple elastic neutron collisions result in a slowly decreasing energy of the neutrons originating from the source.

19. (Previously presented) A method according to Claim 18, wherein said diffusing medium further comprises a neutron moderator surrounding the activation region of the diffusing medium where the exposed material is distributed.

20. (Previously presented) A method according to Claim 19, wherein the diffusing medium further includes an outer buffer region, made of said heavy elements free of the exposed material, located between the moderator and the activation region of the diffusing medium where the exposed material is distributed.

21. (Previously presented) A method according to Claim 19, wherein the moderator is made of carbon or deuterated water.

22. (Previously presented) A method according to Claim 21, wherein the moderator is made of carbon, and has a thickness of the order of 5 to 10 cm.

23. (Previously presented) A method according to Claim 18, wherein said heavy elements are lead and/or bismuth.

24. (Original) A method according to Claim 23, wherein the neutron source consists of a central region of the lead and/or bismuth medium, which is bombarded with a high-energy charged particle beam to produce neutrons by spallation.

25. (Previously presented) A method according to Claim 24, wherein the lead and/or bismuth of said central region is in liquid phase, and is circulated by natural convection along a circuit including a heat exchanger and an auxiliary heater.

26-27. (Withdrawn)

28. (Previously presented) A method according to Claim 23, wherein the neutron source consists of a spallation target bombarded with a high-energy charged particle beam.

29-30. (Withdrawn)

31. (Previously presented) A method according to Claim 17, wherein the exposed material comprises $^{98}Mo$ as said first isotope, which produces $^{99}Mo$ by capturing neutrons from the flux, said $^{99}Mo$ being allowed to decay into the useful radio-isotope $^{99m}Tc$.

32. (Original) A method according to Claim 31, wherein the exposed material comprises a phosphomolybdate complex salt which, after the neutron exposure, is absorbed in an alumina matrix from which the $^{99m}Tc$ is extracted after the decay of a substantial portion of the $^{99}Mo$.

33-48. (Withdrawn)